

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Issued October 10, 1912.

U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN 508.

MARKET HAY.

BY

HARRY B. McCLURE,

*Assistant Agriculturist, Office of Farm Management,
Bureau of Plant Industry.*



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., June 1, 1912.

SIR: I have the honor to transmit herewith a manuscript entitled "Market Hay," prepared by Mr. Harry B. McClure, Assistant Agriculturist in the Office of Farm Management, Bureau of Plant Industry, and recommended that it be published as a revision of Farmers' Bulletin 362, entitled "Conditions Affecting the Value of Market Hay," and that it supersede the first publication.

The purpose of this bulletin is to supply information to hay producers concerning the conditions existing in the various hay markets of the country. The data here given are applicable to all hay-growing sections of the United States.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

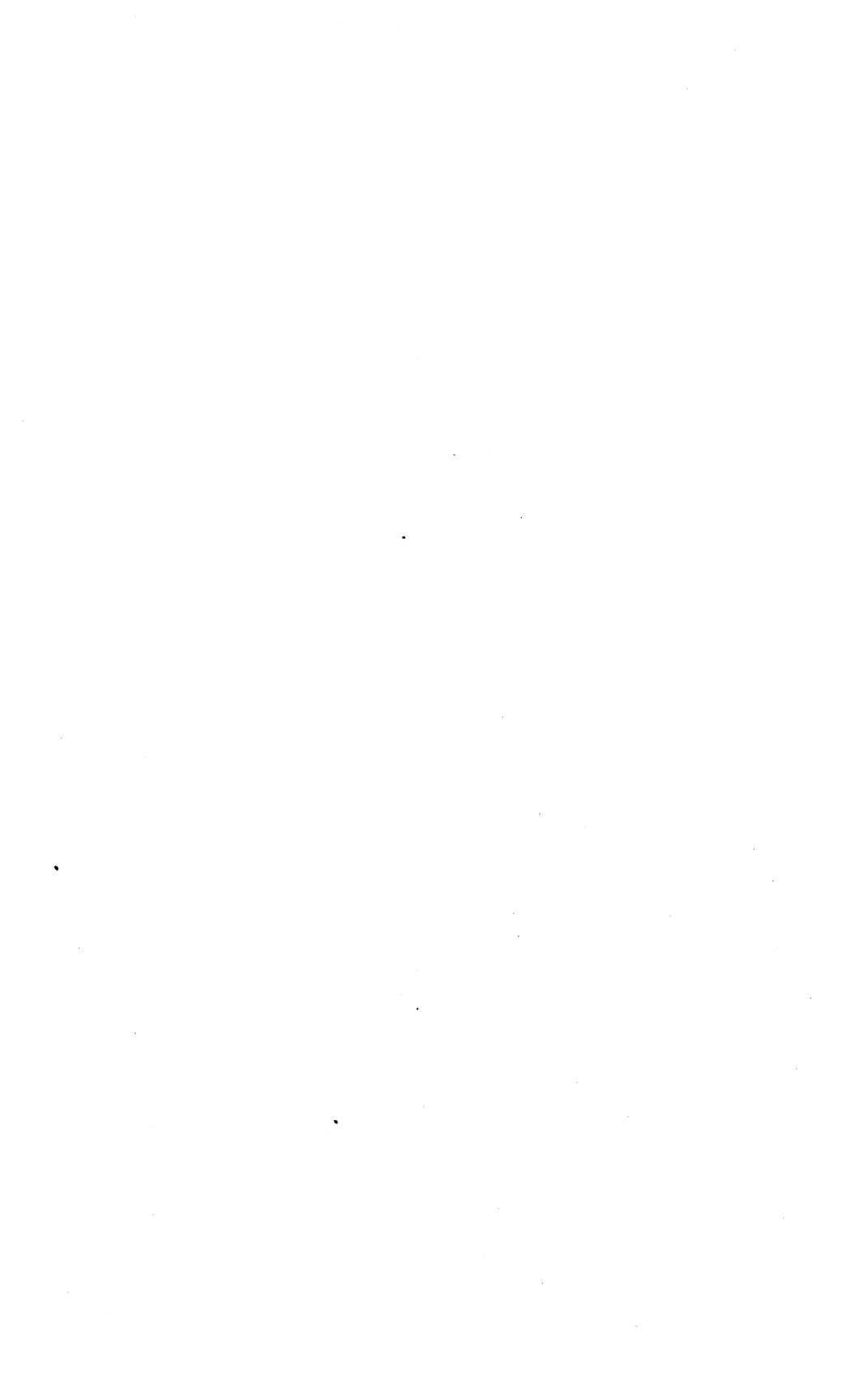
HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction.....	5
Classes of hay producers.....	6
Demand for different grades of market hay.....	7
Supply of different grades of hay in the markets.....	8
Reasons for existing conditions in the supply of market hay.....	8
Condition of the meadows.....	8
Stage at which hay is cut.....	10
Improper methods of curing.....	10
Injuries from the weather in curing and before baling.....	10
Methods of storing before baling.....	11
Sandwiched hay.....	12
Methods of baling hay.....	12
Feeding and operating the press.....	14
Baling direct from the field.....	15
Types of baling presses.....	16
Hand presses.....	17
One-horse presses.....	17
Two-horse presses.....	17
Power presses.....	19
Compresses.....	20
Sizes of bales demanded in the markets.....	20
Sizes of hay presses.....	21
Marking the weight of bales and its effect on prices.....	22
Shipping hay to the market.....	23
Methods of loading.....	23
Inadvisability of shipping "mixed" cars.....	24
Shipping direct to the consumer.....	25
Methods of handling and storing hay in the markets.....	25
Warehouse systems.....	25
Market weights.....	26
Inspection and grading.....	27
Conditions existing in the leading hay markets.....	29
Hay organizations and their influence.....	29
System of hay grades in use in the principal market centers.....	30
Requirements of the markets.....	32
Summary.....	37

ILLUSTRATIONS.

	Page.
Fig. 1. Improperly baled prairie hay, showing rough and ragged appearance caused by overfeeding the press.....	13
2. Type of bale often shipped to market.....	14
3. Proper method of loading cars to utilize all the space.....	24



MARKET HAY.

INTRODUCTION.

As a separate industry growing and marketing hay in the United States is comparatively new. Prior to 1870 marketing was a simple matter and was carried on in a somewhat haphazard manner. Little hay was shipped more than 20 or 30 miles. In many instances the producer sold his product directly to the consumer, and there was little need for standard grades or bales or for other trade rules. Since that time the demand for hay has steadily increased, owing to the growth and needs of the larger cities. The growing of hay for the market has now become one of the leading industries in many parts of the country. It is estimated that about 22 per cent of the 1908 hay crop, or over 15,000,000 tons, was removed from the farms.

There is a considerable difference in the demands of the individual markets in various sections of the country in regard to the size and weight of the bale and the kind and grade of hay which brings the best price. Certain practices in baling and marketing cause a loss to the producer which could be avoided if a proper adherence to the requirements of the markets to which the hay is shipped were observed.

How to dispose of low-grade hay is a vital problem with everyone who handles this class of hay, and every dealer has more or less of it, usually more low-grade hay than any other kind. The shippers, receivers, and dealers can help very much in solving this perplexing problem. The country buyer and shipper especially can help very materially and should use every fair means in his power to lessen the trouble caused by low-grade hay. The first step in the right direction is for the producer to learn the different grades of hay. It is just as important for him as it is for the city buyer to know the grades.

If hay sells by grade in the country the man who has the poorest product will receive less than he does now. At present the man who has choice hay receives less than it is worth on the market, and part of the profit which the shipper makes on the good hay must go to

make up for the loss on the poor hay. With the present system of buying hay there is not enough difference in the price paid for the better grades in the country as compared with the price paid for the lower grades; therefore, if the man who has No. 2 hay receives within 50 or 75 cents of the price of his neighbor's choice hay, he is satisfied and thinks that it is not necessary to take the precautions that his neighbor did in order to get a slight advance.

It is the purpose of this bulletin to discuss in some detail the more important factors involved in the baling, shipping, inspecting, and marketing of this product, and to present the particular requirements of each of the more important markets, so that the individual grower may know the conditions which his hay will have to meet when it reaches the market.

The information here given was obtained through the investigation of 50 of the leading hay markets of the United States and by a study of the methods of production in all the more important hay-growing regions of the country.

CLASSES OF HAY PRODUCERS.

The market-hay producers may be divided into three classes according to the kind of hay produced.

The first class includes those producers who do not keep much live stock on the farm, but who realize the necessity of keeping the soil in as good a state of fertility as possible. They use fertilizers or grow some leguminous crop, either alone or in a mixture with grass hay, and practice a rotation of crops. The use of a proper rotation with fertilizers or legumes, or both, tends not only to maintain the productiveness of the soil and to produce maximum crops, but also to yield hay that contains less weeds and other grasses than when the meadow is not included in a rotation.

The second class is made up of those producers who feed live stock and apply manure to the soil and who sell only the surplus hay. With this class of producers the meadow is included in the rotation and gets the benefit of the manure.

The largest class of producers embraces those who do not include the meadow in the rotation, but who continue to cut hay from it year after year, long after the yield has fallen below the average and after the invasion of foreign grasses and weeds. Such hay grades low, no matter how much care is taken to cut and cure it properly. A study of the relative quantities of the different grades on the various markets and the causes of low grading will show that it is this class of producers which loses most because of lack of knowledge of market demands and of the value of crop rotation.

DEMAND FOR DIFFERENT GRADES OF MARKET HAY.

Market hay may be divided into two classes: City market hay and local, or country, market hay. The line of distinction between these classes is not always clearly drawn, but it may be said in general that the demand in regard to quality and better grades is more rigid in the city than on the local market. All hay sold to feeders in the vicinity in which it is grown or in towns or cities which do not have an organized hay market is classed as local market hay. An organized hay market is one having official inspection, standard methods of weighing and of quotations, and which is supervised by an organization of men in the hay business.

It requires a better quality of hay to grade as "choice" on the city market than on the local market. The several reasons for this will help explain the cause of some of the trouble experienced by shippers. On the local market the producer usually comes into direct contact with the consumer, and hay is not sold according to its official grade, but on its merit. It is designated as "choice," "good bright hay," "fair," "medium," etc. This includes all kinds of hay and hence there is no necessity for the producer to know the commercial grades.

Local market hay is largely the farmer's surplus, and this often contains a larger percentage of "other grasses" and weeds than is permitted on the city market. The producer and local consumer who have little knowledge of official grades do not object to this foreign material.

Compared with marketing hay in the city, disposing of it on the local market is a simple matter, for the producer and consumer can agree as to price and the subject of grade plays but little part in the transaction. When hay is shipped to the city market, however, the grade given by the shipper is of the utmost importance. For these reasons reference hereafter in this bulletin to market hay will refer to city market hay only. The term will include, however, hay sold in southern cities which do not have an organized market but which sell hay that has been inspected and graded in some market during transit.

The prices of the different grades of hay depend in years of normal yield on the demand of city consumers, who may be divided into three general classes according to the kind of hay they feed.

In the first class are the owners of fancy driving and saddle horses who feed the highest quality, or "choice" hay. Such horses must be kept in the best condition, and as "choice" hay is very palatable and agrees with the horse it is used to furnish the required bulk of the ration rather than for the quantity of nutritive substances it con-

tains. "Choice" hay always finds a ready sale, for the demand usually exceeds the supply.

The second class of consumers avoid extremes in both price and grade and feed the medium grades of hay. In the eastern part of the United States "No. 1" and "No. 2" timothy are fed in preference to the other grades, as this kind contains nearly as much total nutriment as "choice." It is also cheaper and requires a smaller addition of concentrates to make up the ration than the lower grades. Consumers of this class are beginning to use mixed (timothy and clover hay) and legume hay, especially alfalfa, in preference to unmixed grass hay.

The third class of consumers feed the lower grades, such as "No. 3" timothy and "no grade." This hay is fed by uninformed feeders because it is cheap and by owners of transient and sales stables who want something to fill up the horse and are not greatly concerned about the nutritive value of the feed. When this kind of hay is fed it is necessary to supplement it with a larger grain ration than when the better grades are used. The quantity of poor hay in the markets is much greater than that of good hay, owing largely to the methods used by certain producers.

SUPPLY OF DIFFERENT GRADES OF HAY IN THE MARKETS.

At present there are no reliable statistics giving the quantity of the different grades of hay received in the markets. The writer's estimate agrees with that of many receivers of hay that the percentage of the different grades of timothy is about as follows: "Choice," 10 per cent; "No. 1," 20 to 30 per cent; leaving the greater part of all hay shipped to grade as "No. 2," "No. 3," and "no grade."

Late cutting, faulty methods of curing, and the presence of "other grasses" and weeds cause much hay to grade low; yet not a little loss is sustained by improper baling and loading into cars, incorrect invoicing, etc.

It is estimated that the quantity of hay shipped to city markets is about equal to that sold locally, but as no record of local sales is available this can not be definitely determined.

REASONS FOR EXISTING CONDITIONS IN THE SUPPLY OF MARKET HAY.

CONDITION OF THE MEADOWS.

Many farmers continue to cut hay from their meadows long after the entrance of weeds and foreign grasses. This not only lowers the grade of the hay produced, but it lessens the yield by so exhausting

the soil that the quantity of hay harvested is not sufficient to pay for the labor.

The most satisfactory method is to include the meadow in the regular rotation, if possible, or at least to grow some leguminous crop or to use sufficient commercial fertilizer, or both, so as to maintain the fertility of the soil. By this means hay becomes a staple crop instead of a by-product, and the farmer can usually count on a very satisfactory return from this part of the produce of his farm.

Many meadows in the eastern part of the great hay section are cut from 6 to 12 years. During this time the yield has become very low and weeds and fine grasses have entered to lower the quality. With such a mixture it is impossible to produce choice marketable hay, no matter how early it is cut or how efficient are the methods of curing.

How long a meadow should remain in hay is a question that can easily be determined by studying conditions, such as decreasing yield, appearance of volunteer grasses, weeds, etc. The length of time a field should remain in hay will depend on the fertility of the soil, the treatment it has in the way of reseeding, and the application of barnyard manure or commercial fertilizers. A newly seeded timothy meadow on good soil should yield on an average $2\frac{1}{2}$ to 3 tons or more of hay the first year. After about the third year the yield begins to fall off until it will remain constant between three-fourths and $1\frac{1}{2}$ tons per acre. This shows why it is so important to know when a meadow should be plowed up and a new meadow started, so that larger or paying yields may be obtained.

This Department has made a special study of crop rotations for hay and grain farms and is willing at all times to place information in the hands of those who wish to better their conditions in regard to hay growing. In planning a cropping system it is seldom advisable to keep the meadow in hay longer than three or four years at the outside. As soon as the yield begins to lessen, the meadow should be plowed and put into some other crop and a new meadow seeded on land which is free from weeds and other grasses.

Every crop takes certain elements of plant food from the soil. It has been found that ordinary soil first becomes exhausted of its supply of available nitrogen, phosphorus, and potassium. These three elements are applied in the form of commercial fertilizers and barnyard manure in order to get paying crops. The producer, whether he uses commercial fertilizers or not, should know that when hay is removed from the farm there is a loss of fertilizing elements which are of value to him but not to the city consumer.

STAGE AT WHICH HAY IS CUT.

Farmers generally prefer timothy for feeding on the farm. When they are cutting it for their own use they wait until the plant has come into the stage known as "second bloom," which occurs after the full bloom has passed. On the local market this hay, when well cured, is called "choice," but the demand is limited to the vicinity in which the hay is grown. When sold on the city market, "choice" timothy means hay cut just as the plant comes into the first or full bloom.

IMPROPER METHODS OF CURING.

In direct sunlight grasses dry out more evenly than legumes. When alfalfa or clover is exposed in the swath to the direct rays of the sun, the evaporation of moisture is so much more rapid from the leaves than from the stems that the leaves become very dry while the stems are still green. This difference gives the hay the appearance of being ready for baling, and is the reason for so much hay being baled too green.

If the hay is raked into windrows as soon as the leaves are well wilted and is then put into tall, narrow shocks and allowed to cure out slowly and thoroughly, so that the leaves will be kept alive to give off the moisture of the stems by transpiration, the farmer can much more easily determine when the hay is thoroughly cured than if the curing is done mostly in the swath or windrow.

If the hay is to be baled direct from the field, successful baling will depend on the thoroughness of the curing in order to avoid heating. This is accomplished by allowing it to remain in the windrow or swath for a longer time than usual, where it will be subject to the action of the sun's rays. This method causes it to lose some of the natural green color that hay must have to be graded as "choice."

INJURIES FROM THE WEATHER IN CURING AND BEFORE BALING.

The term "wet" hay usually refers to hay that has been exposed to snow or rain after having been cured, as in a stack from which a part of the hay has been removed and the rest left unprotected. Such hay is not in proper condition to be baled. If it is baled it will be streaked or stained by the time it is dry. Legume hay when baled wet is likely to heat and rot.

Hay that has been wet should be spread on the ground to dry before being baled, but when it has been wet after curing it should never be sent to the city markets, as the dealers there can not use it. It should not be mixed with dry hay and baled, as is frequently done, for it will lower the grade of the whole and cause greater loss

than if it had been discarded. A tarpaulin which can be thrown over the hay at a moment's notice will guard against wetting and is also useful to protect any hay that must stand out overnight. Damaged hay from the top and sides of the stack may frequently be used to protect the good hay from getting wet.

"Dry" is a term used in the market to designate hay that is too dry when baled. Dry hay will keep better than that having a normal moisture content, which is about 12 per cent for well-cured timothy and 14 per cent for clover, but such hay is discriminated against in the market because the grass hays are believed to lack palatability when dry and because the clover, alfalfa, and grain hays "shatter." Hay grown in irrigated regions is more likely to become too dry than that in the eastern part of the United States. Dry alfalfa loses from 5 to 6 pounds or more per bale from the shattering of the leaves between the time of loading by the shipper and delivery to the consumer.

In the Cincinnati market a car was found in which more than 200 pounds of shattered hay remained after the bales were unloaded. The bales had been handled only twice after leaving the shipper.

METHODS OF STORING BEFORE BALING.

Hay is in proper condition for baling from the stack or barn after it has passed through the process commonly called "sweating." The sweating of hay is due to heat generated by fermentation. The degree of heat produced depends upon the quantity of moisture contained in the hay and the manner in which it has been stored. The fermentation of improperly cured clover and alfalfa hay, whether in stack or barn, may produce a temperature of 265° to 390° F., between which temperatures spontaneous combustion may occur. When the degree of heat produced is above the normal point for proper curing but is not sufficiently high to cause combustion, it causes the hay to lose its natural color or even to decay, making it unfit for feeding purposes.

Sweating usually ceases three to six weeks after the hay is taken from the field, after which it may be baled without danger of spoiling and will keep indefinitely if properly stored.

In the eastern part of the timothy and clover section hay is not considered to be in condition for baling until it has passed through the sweat, while in the prairie-hay sections and in certain parts of the alfalfa sections it is a common practice to bale from the windrows or shock before it has gone through the sweat. Hay baled in this way from the field heats in the same manner as it does in the stack, but if well cured and properly stored the degree of heat attained will not injure its quality or its feeding value.

SANDWICHED HAY.

One of the most objectionable practices in baling hay is that of putting more than one kind of hay into a bale. This is called "sandwiched" hay. This practice is common in sections where it is the custom to stack hay for some time before baling it. It is also common where hay sheds without sides are used or where the barn leaks or lets in the sun, thus causing part of the hay to become stained, bleached, or rotten.

It often happens when the yield is larger than the average in sections where it is the practice to store hay in barns that the surplus is stacked for three or four weeks, or until it has gone through the sweat, and then baled. If the weather remains favorable there will probably be no badly spoiled hay, but the top and sides of the stack may become bleached. Many farmers bale this bleached hay with the unbleached. When the rotten hay around damaged spots in the stack is not carefully cut out, these spots lower the grade of the whole.

No doubt a large part of the sandwiched hay found in bales is the result of carelessness or ignorance on the part of the baler. Sometimes, however, the spoiled hay is placed in the middle of the bale with the express purpose of putting it where it will not be detected until it is opened for feeding. As a result of this intentional sandwiching by a few unscrupulous balers or shippers, any bale showing even a very small stain or spoiled spot on the outside is, in most of our markets, regarded with suspicion by both inspector and buyer and is graded one or more grades lower, even though it frequently develops that the quantity of inferior hay is not more than a handful.

In some of the western markets large bales are not in demand because dealers are afraid they may contain inferior hay. The consumer has the privilege of returning any bales found to contain a lower grade than that bought. When sandwiched hay is returned, the dealer must stand the loss, for it is then too late to make a complaint to the shipper. In order to protect himself, therefore, he buys small bales, for in them it is much easier to detect sandwiching.

METHODS OF BALING HAY.

Each year there is considerable loss in marketing hay on account of improper baling, especially on a crowded, declining market. The rules by which market hay is graded, with the exception of "no grade" hay, require that it be "sound and well baled."

Properly baled hay consists of bales of uniform size, having straight edges, square ends, the proper number of wires accurately placed, and baled in such a manner as to stand handling and shipping

well. Each bale should contain only one grade of hay, composed of enough folds to be easily torn apart when the wires are removed.

Improper baling with respect to neatness and uniformity of bales is caused by improper feeding of the press, such as overfeeding, or by the use of presses that are incapable of making smooth bales. Figure 1 shows prairie hay improperly baled. The rough edges are caused by overfeeding the press.

Bales with sloping ends and ragged edges, quite common on the market, will not stand handling and shipping as well nor sell for as much as smooth bales with square ends. Smooth bales are those in

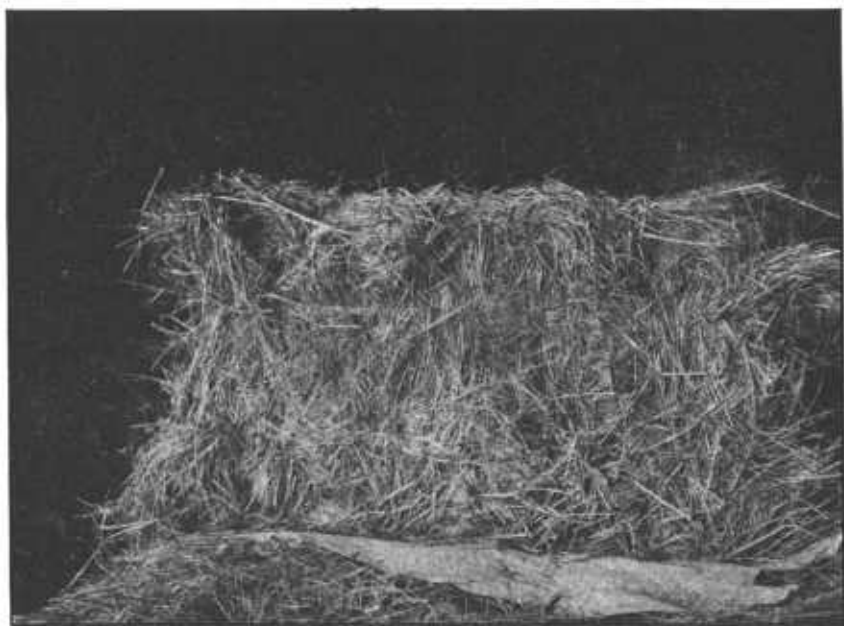


FIG. 1.—Improperly baled prairie hay, showing rough and ragged appearance caused by overfeeding the press.

which the overlap of the charges is neatly turned under and in making which the press is evenly fed. Square ends not only make a neater bale but they hold the wires more securely.

Broken bales are classed as "loose" hay in many markets and are not sold or weighed with the good hay (fig. 2). In one of the southern markets 15 broken bales have been taken from one car loaded with two-wire bales. The inspector at this market stated that it is not uncommon to find a dozen broken bales in a car. In such cases the shipper usually has to stand the loss. The use of three wires on each bale would greatly lessen the loss from this cause.

FEEDING AND OPERATING THE PRESS.

“charge” is the quantity of hay fed into the press at one time and pressed with one stroke of the plunger. If the overlap of each charge is properly folded, the bale will open for use into as many separate parts as there were charges. A good bale for use is one composed of numerous charges which can be easily separated and fed in as small amounts as desired. Small and medium bales have from 8 to 20 charges, the weight of hay in each ranging from about 6 to 15 pounds. A 100-pound bale usually contains about 12 charges. If the press does not separate them well, but strings the hay along



FIG. 2.—Type of bale often shipped to market. It will fall apart when taken from the car and will be classed as “loose” hay.

from one charge to another, the bale presents a rough appearance and makes it difficult for the consumer to separate the charges. Some presses make a bale with one or two charges, but this mats the hay so that it is very difficult to shake out just the quantity required for a single ration. In one market, after an experience in feeding this hay, the consumers refused to pay market prices for it. It was sold for about \$2 per ton less than the same grade properly baled.

From the time the hay is taken from the press until it is delivered to the consumer in the city it is handled 6 to 10 or more times. How well it will stand shipping and handling is determined quite largely by the number of wires and the manner in which they are put on. The number and size of the wires are to be determined by the size

and weight of the bale and in some cases by the requirements of the market as well.

For ordinary purposes two No. 16 wires are sufficient for small bales 14 by 18 inches and 16 by 18 inches, weighing up to 100 pounds. For medium bales, weighing from 100 to 150 pounds, three wires should be used, especially if sent to some of the southern markets. Northern hay shipped to the South often shrinks, causing the wires to become loose. The large upright bales should have five wires to enable them to stand rough handling.

BALING DIRECT FROM THE FIELD.

The practicability of baling hay direct from the field depends upon several factors, such as the value of the land, kind of hay, purpose for which the hay is to be utilized, size of storage room, and scarcity of farm labor.

When tame hay is grown for the market on high-priced land in regions where rain is frequent, the best-known method is to bale after the hay has gone through the sweat in the barn. If, however, it is decided to bale from the field the hay should by all means be cured in the shock and hay caps used for alfalfa and clover hay.

Baling from the field is practicable in regions where land is cheap, especially where prairie hay is grown, because the hay is produced at a lower cost than tame grass and legume hay. The use of sweep rakes makes it possible also to reduce the cost of curing and baling sufficiently to allow a fair profit, even if it is necessary to sacrifice one grade in order to get the hay on the market at once. Under such conditions the farmer who operates his own baling press will make more money by this method than by stacking, as comparatively little prairie hay is put into barns.

Considerable trouble is experienced every year in the markets on account of the "new" hay heating and spoiling. This trouble is likely to occur when hay is baled direct from the field and shipped at once to the market and especially when farmers new at the business attempt to market their crop in this manner.

It is not possible to give any rule or method whereby the farmer may know absolutely when hay is in good condition to be baled from the field. This depends upon the moisture content of the hay, and there is no adequate way by which the farmer can determine this. Some farmers say that hay is in condition to bale when it rattles well or when a wisp can be easily twisted apart and seems dry. The proper stage for baling is more easily determined with the grasses than with the legumes, for the reason that grasses dry out more evenly in direct sunlight than legumes.

In southeastern Missouri alfalfa hay containing 20 per cent. of moisture may be stored in the barn without danger of spoiling, but if such hay were baled it would be certain to heat sufficiently to become spoiled. There is no danger if the moisture content is not above 14 per cent when baled.

Although the success of baling from the field is largely due to the experience of the farmer, due precaution in the method of curing will enable the beginner to avoid much of the loss. The principal objection to the practice of baling from the field is that it is impossible thus to secure as good a quality of hay as when cured in the ordinary manner and put into the stack or barn.

When alfalfa or other legume hays are cured for baling from the field, the loss of leaves is much greater than in the ordinary method of curing and baling. Many farmers are not willing to lower the quality and yield in order to gain time in this way, and this statement especially applies to high-priced land.

Unfavorable weather conditions often prevail in the timothy and clover hay areas which render the practice of baling from the field extremely hazardous; hence this method is restricted to regions of little rainfall, except for small quantities when the barn is full or when a carload can be baled and loaded the same day, etc.

Hay baled from the field is often stored for some time before being shipped. Unless properly stored it is liable to be so damaged from heating that it becomes unmarketable. The danger of damage from heating may be greatly lessened and sometimes entirely avoided by piling the bales so that the air can circulate freely among them. The best way is to place the bales on edge rather than flatwise. In one instance 400 tons of alfalfa baled from the field and piled too closely were lost by heating. Close piling excludes the air and tends to induce heating.

TYPES OF BALING PRESSES.

Many farmers who make a practice of growing hay for market own their presses in order to be able to bale the hay when desired and because they can do it cheaper than they can have it done for them. Those buying their first press are often at a loss to know just what type their needs demand. This is especially true in certain sections of the South, where growing hay for market is becoming a very profitable industry. A number of points are to be considered in buying a baling press after the type has been decided upon.

A large number of different makes of these machines are on the market, and they vary much in cost, construction, durability, and efficiency. The quality of the work done, the capacity of the press,

and the cost of baling per ton depend as much upon the kind of press and its efficiency as upon the skill of the operators. The capacity of the different types generally depends upon the power required to operate them.

Hay-baling presses are divided with respect to the kind and amount of power used into four general classes: (1) Hand presses, (2) one-horse, (3) two-horse, and (4) power or belt presses. There are three types, as determined by the manner in which the bale is made, the bales being designated as (1) loose pressed, (2) perpetual pressed, and (3) double compressed. A brief description of the different kinds of presses will enable the prospective purchaser to decide intelligently which kind of press will suit his needs.

HAND PRESSES.

Hand presses, also known as box presses, were in common use a number of years ago, but at present are little used. Their capacity per hour is small, and it would not be advisable to purchase a press of this kind except when only a few tons of hay are to be pressed for storing on the farm or selling on the local market. Box presses should be used only when the market desires loose-pressed hay. The demand for this type of hay is rather limited and is confined to restricted localities.

ONE-HORSE PRESSES.

One-horse presses are of two types—the box and the perpetual. A perpetual press is one into which hay is fed continuously, the finished bale being forced from one end of the press by the plunger. The perpetual is an improvement over the box type, because it makes a bale from a number of charges, which are easily separated when the bale is opened, and because it provides for a greater degree of compression than the box press.

One-horse presses are not used extensively, for although they are capable of making a neat bale their capacity is small. They have been superseded by the two-horse and the power presses for baling hay for shipment, as it is often necessary to bale out a carload lot in one day.

TWO-HORSE PRESSES.

The 2-horse perpetual press is the type most extensively used for ordinary baling. The following points should be considered when buying a press of this type: The mechanism for transmitting power, the plunger return, the feed opening, convenience in tying, the difference between the continuous-travel and the reversible-power types, the tension, the folder, and the self-feeding attachment.

The mechanism for transmitting power is the machinery used for transmitting the energy of the horses to the plunger. This mechanism should be heavy, durable, and simple in construction, should work smoothly without loss by friction, and should be cumulative, i. e., the leverage of the horses should increase in proportion as the hay becomes compressed, so that when the heaviest pressure is needed the power delivered is greatest. The mechanism should be so arranged that the heaviest pull does not occur when the team is crossing the step-over bridge, but when it is parallel with the press.

The plunger is usually returned by an automatic mechanism or by a spring. In either case the return should be positive. When a spring is used it should return the plunger evenly, i. e., it should not stick when large charges are fed or return with such force that the hammering will wear away or break the press.

The size of the feed opening determines the quantity of hay that may be fed at one charge. It also determines the ease with which the press may be fed and its capacity. Presses with small feed openings are likely to be overfed. When this occurs the feeder often fails to get the hay well down into the chamber. The result is a bale with ragged edges.

Convenience in tying is determined by the type of the press. Presses operated without removing the wheels are arranged so that the man who ties will stand, but when the wheels must be removed he is required to kneel in order to pass the wires through and make the tie.

The continuous-travel press is so called because the team continues to travel in a circle. This type of press is much used in the North-Central States. With most presses two strokes of the plunger are made while the team travels once around the circle. A few presses make three strokes, which increases the capacity, provided time is given for feeding each charge properly and the team is able to stand the work.

The reversible-power type of press is sometimes called the half-circle press, for the team travels half a circle, turns around, and pulls the lever back to the other side, a charge being pressed each way.

The continuous-travel press has the advantage over the half-circle press in that teams not used to the work require little or no training, while with the reversible type considerable time is lost in training a team to turn quickly.

The tension, whether on the side or top, should be simple, easily adjustable, and without complication.

The folder should work freely and turn down the overlap smoothly, making even bales when either large or small charges are fed.

Several types of self-feeding attachments have been invented for horse-power presses. These attachments lighten the work of the feeder, making it unnecessary for him to use his foot in forcing the hay into the chamber. This dangerous practice sometimes results in a badly crushed ankle or the loss of a foot.

The length of the stroke, construction of the headblock and chaff grate, height of step-over bridge, whether the division block may be dropped without loss of a feed or danger of breakage, adaptability to barn work, time and labor required in setting the press for work, number of extras included with the press, etc., are other minor points to be considered.

POWER PRESSES.

Power presses are of comparatively recent origin and are used by shippers and producers who bale hay in quantity requiring a greater capacity than that of the 2-horse press. Steam or gasoline engines having a rating of 6 to 10 horsepower are required for ordinary power presses, and for the compresses a rating of 15 to 20 horsepower is necessary. The capacity of power presses is from 2½ to 5 tons per hour, or about twice that of the common 2-horse press. The durability and capacity of power presses depend on the construction of the more important parts. The principal differences are in the mechanism for transmitting power, the feed opening, the manner of dropping the division board or block, and the material used in the frame.

The mechanism for transmitting the power may be either double or single geared. The press having few parts, well made to stand the strain of heavy pressing, will have a longer life than one of many small parts.

The feed opening of a power press is made in two styles, stationary and expanding. The latter type opens when the press receives a charge and partially closes as the feeder arm descends. The makers of this type claim that this increases the capacity of the press.

Some presses have an automatic block dropper that places the block without the loss of a feed or charge. In other presses the block is placed by hand with the loss of one feed. In some presses placing the block by hand is somewhat dangerous to the feeder.

The material used for the frame may be steel or wood or a combination of both. Makers of each type advance reasons for the advantages of their own type of construction. A study of the general style of the press in the light of the principles stated will enable the farmer to decide which is the best for his purpose.

A number of other differences in the various types of power presses, such as the type of indicator, the kind of feeder, the lever-

age, the length of stroke, the use of a flywheel, the style of brake, etc., have a bearing on the quality of the press. All the leading makes should be carefully studied before a purchase is made.

The question often arises as to which type of press will give the greatest satisfaction. In many instances the quantity of hay to be baled and the length of time it takes to bale it are the determining factors. The labor required must also be considered. The 2-horse press requires only 4 or 5 men, while the power press can not be run with less than 8 or 10 men. If the owner grows hay on a very large scale or intends to make a business of baling for others, a power press will suit him best. If the power press is to be used only on the farm to bale a few carloads of hay at a time, then the advisability of buying such a press is questionable. When a power press or the engine breaks down the time lost by the crew is very expensive compared with that lost by the smaller crew of the 2-horse press. Furthermore, the latter is less likely to break down when properly operated than a power press and traction engine.

In case the farmer needs a tractor for other operations than baling it would be advisable to purchase the power outfit.

COMPRESSES.

Compresses are used almost exclusively for baling hay for the export trade. They press a ton of hay into about 50 to 70 cubic feet. As their use is quite limited it will not be necessary to discuss this type in this bulletin.

SIZES OF BALES DEMANDED IN THE MARKETS.

The size and weight of the bales are important in most markets. Unless the hay is "choice," it is seldom that two sizes of bales will sell equally well. To purchase a press of the proper size the producer must know the demands of the market to which his hay will be shipped. Usually a man ships his hay into one general locality where the demand in regard to size and weight of bale is uniform.

A study of hay markets has shown that the ease with which a bale can be handled is often responsible for its popularity. Thus, the small bale weighing up to 100 pounds is in demand because one man can load, unload, and deliver it; whereas it requires two men to handle the large upright bale weighing 200 pounds or more.

In the South a large amount of hay is shipped by boat to the smaller town. The small bales are in demand because one man can easily carry such a package up a steep gangplank, and it requires much

less time to handle the hay under these conditions than when large bales are shipped. In certain western markets it frequently happens that baled hay, especially alfalfa, becomes heated. Here the small bale is popular for the reason that such heating is easily detected, while the interior of a large bale may be spoiled with no indication of it on the outside.

For the general retail trade in the South small bales weighing about 70 pounds, or not less than 30 bales to the ton, are the only size that sell to advantage. The reason is that the average retail dealer sells most of his hay in small lots, a bale or two at a time, to persons owning one or two horses. They like to buy a bale that costs less than \$1. Again, hay is sold in many southern cities at so much per bale instead of by weight. A tightly pressed bale 14 by 18 inches, containing 100 pounds, will not sell for the same price as quickly as a 16 by 18 inch bale containing 70 pounds, because the consumer buys the bale that "looks bigger."

The greatest objection to small bales from the shipper's point of view is that it is often impossible to put into small cars a sufficient number of bales to make up the minimum freight weight assigned to the car.

The large upright bale is popular in several of the eastern markets and in western grain-hay markets. If the hay is "choice," large bales sell well at wholesale, since consumers who use carload lots buy hay by actual weight and prefer large bales.

One objection to large bales is that consumers think that the hay in such bales has had "the life pressed out of it." The injury, however, is largely imaginary.

In a few markets the large, loosely pressed box bale is preferred, chiefly because consumers have been accustomed to the box-pressed hay and have never tried properly baled perpetual-pressed hay.

SIZES OF HAY PRESSES.

At the present time more than 70 makes of hay presses are on the market. As a result of the combined efforts of the hay associations and the manufacturers the sizes of presses have been standardized within the past few years, making it easier for the farmer to decide the proper size to buy.

The sizes in general use now are as follows, according to the class of bales made:

Dimensions of small bales.....	{ 14 by 18 by 38 inches.
	{ 16 by 18 by 36 inches.
Dimensions of medium bales.....	{ 17 by 22 by 36 inches.
	{ 18 by 22 by 36 inches.
Dimensions of large bales.....	22 by 28 by 46 inches.

The length of either size may be greater than the length here given. These sizes, with the exception of the 18 by 22 by 36 inch bale, are those in greatest demand in various city markets, and in these markets they are known as standard bales.

The various box presses make bales of a miscellaneous assortment of sizes, such as 42 by 18 by 20 inches, 44 by 24 by 22 inches, and 60 by 26 by 24 inches.

In respect to weight the standard bales vary as follows: Small bales from 70 to 100 pounds, medium from 100 to 150 pounds, and large from 150 to 250 pounds. This variation is due partly to the degree of compression and partly to the length of the bale.

MARKING THE WEIGHT OF BALES AND ITS EFFECT ON PRICES.

It is a common practice in many sections of the country to tag each bale with its weight as it is taken from the press. The tag weight is obtained by weighing on a small truck scale placed near the press. Hay is tagged in order that the baler may know the quantity pressed and to avoid the necessity of weighing when sold where wagon scales are not easily accessible.

Tag weights in general are not reliable except when the hay is honestly weighed and immediately shipped to market. They have caused so much trouble in city markets that at present they are very little used.¹

The reasons that tag weights are often incorrect may be stated as follows: (1) New hay properly tagged, if stored for some time, will lose weight by shrinkage, the loss depending on weather conditions and the moisture content of the hay when baled. A 200-pound bale may lose 10 or 12 pounds in the course of several months. On the other hand, hay baled dry may gain in weight during a continued period of wet weather. Grain and alfalfa hay often weigh less than the tag weight on account of the loss from handling the bales. In either case the tag weight is incorrect. (2) The weight is often marked up so as to make the totaling easier for the weigher, as for example, if a bale weighs 83 pounds it may be marked 85. This increases the profit in case the baling is done by the ton, or it may happen because of carelessness in weighing. It is sometimes the custom to weigh 10 or 15 bales when a new stack or mow is opened and use the average, with an occasional variation for all of the bales, thus saving time and labor for the weigher.

The retail dealer is the only one except the producer who uses tag weights. Some retail men buy on railroad or other official weight

¹ See General Business Law, New York State, secs. 253-255, on tagging hay and the use of wooden tags.

and sell by tag weight. This usually gives them extra profit, for the weights are often a few pounds too high.

When a producer insists on selling his hay by tag weights, the price offered per ton is very likely to be from 50 cents to \$1 lower than if the hay is weighed on wagon scales at the time of delivery.

An illustration of the trouble often caused by tag weights is where a consumer has bought a car of hay containing 10 tons, tag weight, but the actual scale weight, obtained when the car is unloaded, shows that the weight is but $9\frac{1}{2}$ tons. If he makes a claim for shortage to the city consignee, the claim may be passed on to the country shipper, who in turn may make a claim for shortage on the producer. If the producer has hired the baling done the person who did the work should stand the shortage, but he would claim that the hay was properly tagged and that the loss is due to shrinkage in handling, etc., and that he is not responsible. In actual practice, however, the claim would not be referred to the baler, but might be settled by the consignee, the shipper, or the consumer.

To avoid such disputes and claims it is the almost universal custom now to sell on actual weight on delivery at destination, unless the shipper has established a reputation for selling "full weight," in which case his weights will be taken.

SHIPPING HAY TO THE MARKET.

A thorough knowledge of trade rules is necessary for the successful shipping of hay, for when shipper and receiver do not have the same understanding of rules or terms trouble is likely to occur, and this causes a loss to one of the parties to the transaction.

It frequently happens that cars are improperly loaded when hay is being shipped, owing either to the quantity or the kinds of hay contained in the car. The minimum freight rate must be paid on every car, and unless enough hay is put in to make the minimum load the shipper is obliged to pay the charges on the amount of the shortage. It is impossible to load some of the old small-size cars to the minimum weight because the cubic capacity is not sufficient to hold the minimum-weight load of hay when baled in the ordinary way. Very little trouble of this kind is experienced with cars more recently built.

METHODS OF LOADING.

The chief reason for failure to load the required amount is that the hay is too loosely pressed. This is often the case with small bales containing about 70 pounds. If 100 pounds or more were put into a bale of the same size this trouble would not occur. Another im-

portant reason is that the bales are not placed so as to utilize the space to the best advantage. Figure 3 shows the proper way to load 17 by 22 inch bales (a) and 14 by 18 inch bales (b) in an ordinary box car 6½ feet high, 7½ feet wide, and 30 to 34 feet long.

INADVISABILITY OF SHIPPING "MIXED" CARS.

A "mixed" car is one that contains two or more grades of hay. These cars often cause trouble in the market if received or sold on door inspection. Trouble occurs when the good hay is placed in front of the doors and the poor hay back so that the inspector can not see it. The entire car is therefore graded the same as the hay at the doors, and when it is unloaded the loss falls on the shipper.

Not all mixed cars are mixed intentionally. For example, it may frequently happen that the shipper will leave the loading to one of

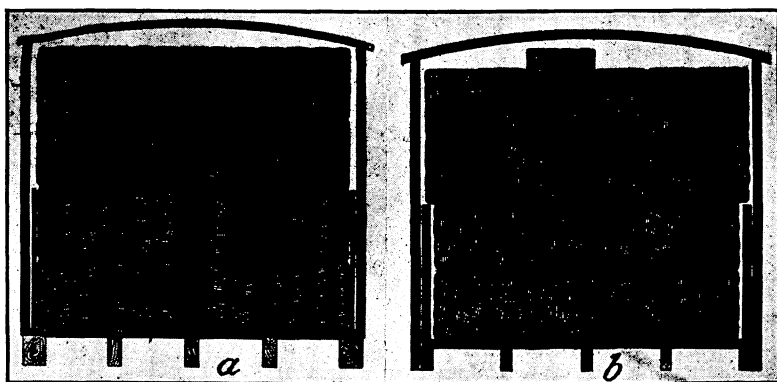


FIG. 3.—Proper method of loading cars to utilize all the space: (a) Bales 17½ by 22 inches, 16 bales per tier; (b) bales 14 by 18 inches, 25 bales per tier. Car shown is an ordinary box car 6½ feet high, 7½ feet wide, and 30 to 34 feet long.

his buyers, who in turn leaves it to the producer who is delivering hay at the car. It is readily seen how easy it would be for the producer's teamsters to make mistakes, especially with no one present to inspect the bales as they are put into the car. When a claim is made by the consignee, the shipper is honest in his contention that the hay was just as he represented it. Much trouble and loss would be avoided if the shipper or his agent were present when cars are loaded, instead of leaving it to some one who perhaps knows very little about grades.

When cars are mixed intentionally, the shipper should specify in the bill of lading the quantity of each kind, or if the hay is not to be given bale inspection should notify the consignee in some way.

SHIPPING DIRECT TO THE CONSUMER.

Many producers are able to command a much better price for their hay by shipping direct to the consumer than by shipping to some city market, especially if the consumer lives in the country, because the demands of the individual consumer in the country are often quite different from those of the city consumer. Hay in the tame-hay section can often be sold to better advantage to local cattle feeders, dairymen, liverymen, etc., than by shipping it. These consumers use large quantities, care but little for market grades, and have no objections to mixtures or to certain sizes of bales not wanted in the city markets.

Several growers in the South sell all their alfalfa or other hay direct to country consumers and make a fair profit on their product, whereas if their hay were shipped to market and subjected to a rigid inspection they could realize but little profit.

It is necessary in making quotations to consumers to describe the quality of hay so that they will be able to form an opinion as to its feeding value. This is very important in selling directly from the producer to the consumer for the first time. The most successful farmers who ship hay direct often send a car as a sample of their product, either their best, their medium, or their poorest hay. In this way the consumer can get an idea of the different kinds and will understand quotations in the future.

A weak point in this system of selling is that sometimes the producer substitutes inferior hay in a second shipment, or the consumer claims it to be inferior to that bought. It is seldom, however, that either producer or consumer will resort to such a practice, for generally the producer wishes to retain steady customers and the consumer is anxious to purchase hay from a reliable source.

METHODS OF HANDLING AND STORING HAY IN THE MARKETS.**WAREHOUSE SYSTEMS.**

The three principal methods of handling hay at the markets are (1) on holding tracks, (2) in private warehouses, and (3) in terminal warehouses.

(1) Some railroads provide certain tracks or yards where the cars are held until the hay is sold. In some cities instead of having several holding yards the hay is all held in one yard owned by a terminal railroad company. The advantage of this system is that the buyer can make his inspection in a few minutes each day and buy his supply from the commission men who are on the ground. Where there are several holding yards, buyers and sellers meet at each yard

at a designated time each day. A disadvantage of this system is that the hay must be sold and unloaded within a specified time, usually 48 hours after arrival, or demurrage will accrue. Unless the arrival of the shipments at such a market is uniform, there will frequently be an oversupply or a scarcity of the product, which tends to cause fluctuations in prices. This tendency to fluctuate may be checked somewhat if there are enough private warehouses to store several days' consumption of hay.

(2) The private-warehouse system is used in most markets. This system is satisfactory when it is desired to store hay for some time, and especially so if the warehouse has a private track easily accessible from the different railroads, thus saving transfer charges from car to warehouse, extra switching, demurrage, and storage charges. Private warehouses have a storage capacity of quantities ranging from a few carloads up to 200 carloads, which would be approximately 2,000 tons of hay. It is customary in some warehouses to place the hay from each car by itself or to put only one grade in a pile. By piling the bales in this way it is easy to fill an order quickly for any grade desired. It also enables the buyer to purchase carload lots of uniform grade.

(3) Hay may be handled by a terminal-warehouse company or by railroad warehouses. On arrival at these warehouses it is weighed and unloaded at once and placed for inspection and sale, the contents of each car, if uniform, being kept separate. If it is not uniform it is separated into the various grades. Some warehouse companies store the hay free for five days, after which storage at the rate of about 30 cents per ton is charged for each period of 10 days, the owner standing the risk from fire.

In Baltimore the cost of unloading, weighing, piling for inspection, and reloading in case it is shipped out is paid by the railroad company. This is done in order that the cars may be used again as soon as possible. This system is perhaps one of the best and quickest methods of handling and storing hay, especially if the weighing is accurately done.

MARKET WEIGHTS.

Correct weights are of vital importance to the hay dealer, and the market having good weights has a decided advantage over the one with poor weights. The common methods of weighing are on railroad-track scales, hand-truck scales, and wagon scales, and under certain conditions each method may have its faults.

Railroad weights are understood to be gross weight, taken while the car is moving over the scale at any speed up to 5 miles an hour. From this gross weight is subtracted the stenciled weight of the car,

or the weight of the empty car taken at the time it was built. No doubt the speed of the car while passing over the scales affects the weights somewhat, but this is not as serious as an inaccurate stenciled weight. It often happens that the original stenciled weight of a car remains unchanged after the car has received repairs, such as new trucks or roof, which may have materially changed the original weight.

At the terminal warehouse in Baltimore the empty as well as the loaded car is weighed on track scales, thus insuring accurate weights. The reason the stenciled weight is relied on as correct is that in some markets the track scales may be several miles from the place where the hay is delivered and it would not only be expensive to haul back the empty cars but there would be much delay in selling the hay.

In some markets where the hay is unloaded directly from the car into the warehouse it is customary to use hand-truck scales. All the hand trucks are standardized under these circumstances; that is, lead weights are added to each truck until it is brought to a certain weight. Three large or four small bales are placed on a truck, which is wheeled to the scale and weighed, a record being kept of the number of bales of each grade and the total number. This system gives accurate results if the weighmaster is careful, but if the scale is not properly balanced and the weighing is carelessly done the total error may amount to several bales.

When wagon scales are used they should be frequently inspected, for scales exposed to the weather, as wagon scales usually are, are liable to get out of adjustment. The presence of mud on the wagon wheels, the pulling or backing of the horses, etc., affect the accuracy of the weighing.

Nearly all large markets have official weights; that is, both the weighing and the inspection of scales are under the supervision of some trade organization or of the city or State. The weighmaster furnishes a signed statement of the contents and weight of each load or car, so that the hay may be traced to the car from which it came and the consignee may have an official weight when settling for the hay.

INSPECTION AND GRADING.

Hay is inspected to determine definitely its quality, which is expressed in terms of grades. Many times inspection is needed because the shipper does not know the grades of hay or because the shipper or the consignee is of the opinion that his product is of a higher or lower grade than it really is.

The methods used for inspection at the markets are known as "door inspection," "bale inspection," and "plug inspection." In door inspection the inspector grades the entire car by the quality of

the hay at the doors. This method is of value only when the door hay truly represents the entire contents of the car. If it contains poorer grades which the inspector is unable to see, the inspection is of little value and may result in loss to the shipper by being rejected.

Bale inspection, sometimes called reinspection, consists of inspecting the hay one bale at a time. This is resorted to when the purchaser on unloading a car that has been door-inspected finds that the car has been "plugged;" that is, contains lower grades than that purchased. He may either then reject the entire car or else may accept it by paying for the various grades other than that the car is supposed to contain at the market quotations for that day. In deciding to accept the entire car he asks for a reinspection, and the inspector in making this catches each bale with a hook as it is passed out of the car so that he can turn it and examine each of the four sides in the best light, keeping a record of the number of bales of each grade.

Where hay is not sold on the track, but is unloaded into warehouses, it is customary to give it bale inspection as it comes from the car or to pile it in the warehouse in such a manner that the inspector will be able to see as much of it as possible. In New Orleans the inspector tags each bale with its weight and grade as it comes from the car into the warehouse. If a car is rejected on account of being loaded so that the inspector can not grade it accurately on door inspection it must be sold again and for less than if the grades were known when first offered for sale. This loss may be avoided by proper invoicing when the car is shipped.

In making "plug inspection" the hay in front of the doors and a section through the middle of the car to each end is removed so that the greater part of the car can be inspected. After inspection the hay is replaced in the car. Plug inspection is chiefly used in markets that make a practice of reshipping hay in the same car, as when northern timothy is shipped to St. Louis or Kansas City and thence reshipped to points in the South. When the country shipper gives the true contents of a car and has done this long enough so that the consignee can depend on his bill of lading, and if the shipper can also depend upon the consignee to accept his grading, there is no necessity for inspection and these charges may be saved. The charge for door inspection in Cincinnati is 40 cents per car; for bale inspection, 60 cents. In other markets the charges vary from 50 cents to \$1 a car.

The value of official inspection lies in avoiding the unjust claims which are frequently made when the hay is not properly billed or when the parties are not well known. A large percentage of market hay is not inspected except in those markets where inspection is required by State law. Reliable shippers and consignees do not have

their hay inspected because they know the grades of hay in the markets. These men are able to save the inspection charges. The city dealer cares very little about inspection, for he also knows the grades and when he can see the hay in a warehouse or in any other place he is willing to use his own judgment rather than that of the inspector.

In case the shipper thinks the inspection is not correct he may appeal to the organization having supervision of the inspection, which will appoint a competent committee to pass on the case. It is seldom, however, that the inspector's judgment is reversed.

Recently country shippers have agitated a uniform inspection in those markets which have adopted a plan of grading hay. This has been brought about on account of the variations in inspection under the present rules of grading. That there is variation and lack of uniformity in some of the markets can not be denied. The reasons given for the need of this uniform inspection are that at the present time it is not only necessary for the country shipper to know the rules of grading, but he should also know how his hay will be graded in each market to which he ships. If he does not know these rules he is likely to lose money when shipping certain grades to markets with which he is not familiar.

The general character of the hay received at each market may or may not cause the rules to be strictly adhered to. For example, if the greater part of the hay received in a market is of low grade, the hay that grades "choice" may be of a lower standard than that graded "choice" in a market where most of the hay received is free from weeds and foreign grasses, is properly cut and cured, and properly baled.

CONDITIONS EXISTING IN THE LEADING HAY MARKETS.

A system of grading hay has been adopted by the hay exchanges in various cities, and their rules and methods are given in this bulletin for the information of the farmer who is producing hay, either as a part of his regular crops or merely as a surplus crop. The Department of Agriculture in publishing these requirements does not present them as a satisfactory system. The Department has not adopted nor does it recommend this method. The system is here presented for information without regard to its merit.

HAY ORGANIZATIONS AND THEIR INFLUENCE.

With the development of baling presses and the shipping of baled hay to city markets, trouble frequently arose between shipper and consignee over the quality of the shipment, especially where the con-

signee had not seen the hay, but had bought it on representation made by the producer or shipper. Even where there was no attempt on the part of the shipper to substitute inferior hay for that called for in the contract trouble often developed over a difference of opinion as to what constituted a certain grade of hay. The need of organization for the benefit of all concerned soon became apparent. The development from the venturesome methods of the early seventies to an industry that has been placed upon a firm business foundation is due in large measure to organization and cooperation among those engaged in the production and utilization of hay.

Commercial organizations that are almost indispensable in the hay trade are boards of trade, merchants' exchanges, hay and grain exchanges, etc. The duty of these organizations is to supervise the weighing, inspection, and handling of hay, to issue market reports, and to formulate and enforce trade rules.

These hay associations have not only brought about many needed changes in the manner of disposing of hay in the market, but they have made it possible for the producer who knows the requirements of his market to engage in the growing and marketing of hay with more assurance of success than ever before.

This method of organization has caused many changes in the hay industry, especially in regard to grades of hay, baling practices, standardizing bales, and market demands.

Standard grades of timothy, clover, prairie hay, straw, mixed hay, and alfalfa have been adopted in most of the important markets, and it is of vital importance to the producer to know and meet the demands of the market to which he ships.

The lack of knowledge causes the loss of thousands of dollars annually. For example, a press may be used that does not make a bale of the right size or weight for a given market. In New York City timothy hay in large bales sells at a much better price than the same grade in small bales, while the reverse is true in the southern markets. Shipping the wrong kind to either market is sure to lower the prices paid and gives rise to much misunderstanding between the shipper and the receiver. Putting more than one grade of hay in the bale is another cause for loss. This difficulty could be avoided by a study of the rules of the particular market.

SYSTEM OF HAY GRADES IN USE IN THE PRINCIPAL MARKET CENTERS.

Those hay associations which have made their system of grading uniform have adopted rules governing inspection as follows:

Choice timothy hay.—Shall be timothy not mixed with over one-twentieth other grasses, properly cured, bright natural color, sound, and well baled.

No. 1 timothy hay.—Shall be timothy with not more than one-eighth mixed with clover or other tame grasses, properly cured, good color, sound, and well baled.

No. 2 timothy hay.—Shall be timothy not good enough for No. 1, not over one-fourth mixed with clover or other tame grasses, fair color, sound, and well baled.

No. 3 timothy hay.—Shall include all hay not good enough for other grades, sound, and well baled.

No-grade hay.—Shall include all hay badly cured, stained, thrashed, or in any way unsound.

Light clover mixed hay.—Shall be timothy mixed with clover, the clover mixture not over one-fourth, properly cured, sound, good color, and well baled.

No. 1 clover mixed hay.—Shall be timothy and clover mixed, with at least one-half timothy, good color, sound, and well baled.

No. 2 clover mixed hay.—Shall be timothy and clover mixed, with at least one-third timothy, reasonably sound and well baled.

No. 1 clover hay.—Shall be medium clover not over one-twentieth other grasses, properly cured, sound, and well baled.

No. 2 clover hay.—Shall be clover, sound, well baled, not good enough for No. 1.

Choice prairie hay.—Shall be upland hay, of bright natural color, well cured, sweet, sound, and may contain 3 per cent of weeds.

No. 1 prairie hay.—Shall be upland, and may contain one-quarter midland, both of good color, well cured, sweet, sound, and may contain 8 per cent of weeds.

No. 2 prairie hay.—Shall be upland of fair color, and may contain one-half midland, both of good color, well cured, sweet, sound, and may contain 12½ per cent of weeds.

No. 3 prairie hay.—Shall include hay not good enough for other grades and not caked.

No. 1 midland hay.—Shall be hay of good color, well cured, sweet, sound, and may contain 3 per cent of weeds.

No. 2 midland hay.—Shall be fair color or slough hay of good color and may contain 12½ per cent of weeds.

Packing hay.—Shall include all wild hay not good enough for other grades and not caked.

No-grade prairie hay.—Shall include all hay not good enough for other grades.

Choice alfalfa.—Shall be reasonably fine leafy alfalfa of bright green color, properly cured, sound, sweet, and well baled.

No. 1 alfalfa.—Shall be coarse alfalfa of natural color or reasonably fine leafy alfalfa of good color, and may contain 5 per cent of foreign grasses; must be well baled, sound, and sweet.

No. 2 alfalfa.—Shall include alfalfa somewhat bleached, but of fair color, reasonably leafy, not more than one-eighth foreign grasses, sound, and well baled.

No. 3 alfalfa.—Shall include bleached alfalfa or alfalfa mixed with not to exceed one-fourth foreign grasses, but when mixed must be of fair color, sound, and well baled.

No-grade alfalfa.—Shall include all alfalfa not good enough for other grades, caked, musty, greasy, or thrashed.

No. 1 straight rye straw.—Shall be in large bales, clean, bright, long rye straw, pressed in bundles, sound, and well baled.

No. 2 straight rye straw.—Shall be in large bales, long rye straw, pressed in bundles, sound, and well baled, not good enough for No. 1.

No. 1 tangled rye straw.—Shall be reasonably clean rye straw, good color, sound, and well baled.

No. 2 tangled rye straw.—Shall be reasonably clean, may be some stained, but not good enough for No. 1.

No. 1 wheat straw.—Shall be reasonably clean wheat straw, sound, and well baled.

No. 2 wheat straw.—Shall be reasonably clean, may be some stained, but not good enough for No. 1.

No. 1 oat straw.—Shall be reasonably clean oat straw, sound, and well baled.

No. 2 oat straw.—Shall be reasonably clean, may be some stained, but not good enough for No. 1.

The foregoing system of grading hay and straw has been adopted by hay exchanges in the following markets:

Atlanta, Ga.	Jacksonville, Fla.	Pittsburgh, Pa.
Baltimore, Md.	Kansas City, Mo.	Richmond, Va.
Buffalo, N. Y.	Minneapolis, Minn.	Saginaw, Mich.
Chicago, Ill.	Minnesota (State).	St. Louis, Mo.
Cincinnati, Ohio.	Nashville, Tenn.	St. Paul, Minn.
Cleveland, Ohio.	New Orleans, La.	Savannah, Ga.
Duluth, Minn.	New York, N. Y.	Toledo, Ohio.
Indianapolis, Ind.	Philadelphia, Pa.	Washington, D. C.

Atlanta and Baltimore use these grades in part only.

REQUIREMENTS OF THE MARKETS.

Table I contains general information concerning the kinds of hay, size of bale in demand in the different markets of the United States, and other data. This information is given here to enable the average producer to have more definite knowledge of conditions in the market to which his hay may be shipped.

TABLE I.—The requirements of the various eastern, western, and southern hay markets, showing kinds of hay received, types of bales, methods of inspection, weights, and the most common faults that affect the selling price.

EASTERN MARKETS.

Markets.	Kinds of hay received. ¹	Types of bales in demand (weights in pounds).	Inspection.	Kinds of market weights used.	Methods of receiving and selling.	Common faults that affect the selling price of market hay.
Baltimore, Md.	Tim, cl, cl-mx.	Small 3-wire ² (100), large (200-230).	Warehouse.	Car, loaded and unloaded, at terminal warehouse.	Warehouse, each carload separated into grades.	Presence of fine grasses, weeds, daisies, and plantain; meadows kept in hay too long.
Boston, Mass.	Tim, cl-mx, cl, some al.	Large upright ² (190-220), small.	None.	Official ³ .	Terminal warehouses.	Late cutting, mow burn, and presence of weeds and daisies.
Buffalo, N. Y.	Tim, small demand for cl-mx.	Medium (130-140), large. ²	Door.	Public scale, tag.	Private and terminal warehouses.	Improperly cured and late cut.
Chicago, Ill.	Tim, cl, cl-mx, pr.	14 by 18 inches (100), 16 by 18 inches (125).	Door, bale.	Railroad, official.	Holding yard, private warehouses.	Presence of other grasses; cut too late.
Cincinnati, Ohio.	Tim, cl-mx, cl, alsike cl.	Small ² (100-125), large (200-230).	do.	Official, on hand-truck scales at warehouses.	Private warehouses; sold by sample on hay exchange.	Clover cut too late; presence of white mold, weeds, and stubble; "white top," very common; bales often "sandwiched."
Cleveland, Ohio.	Tim, cl-mx, cl.	Medium.	Door.	Shipper's, with guarantee attached.		
Columbus, Ohio.	Tim, cl-mx.	Medium, small.	Door.	Railroad, shipper's, consignee's.	On track, private warehouses.	Streaked bales, caused by improper curing; considerable wet hay received.
Duluth, Minn.	Tim, upland pr, mx.	Small (100).	Door, bale.			
Indianapolis, Ind.	Tim, cl-mx.	Small, large.		Railroad track scales.	Private warehouses.	
Minneapolis, Minn.	Tim, cl-mx, pr.	Medium.	Door, warehouse.	Tag, corrected by averaging actual bale weights.	Terminal warehouses.	
New York, N. Y.	Tim, cl-mx, cl, some al.	Large upright ² (190-220), small (100-125).	Door, warehouse.	Railroad track scales; wagon scales at private warehouses.	Holding yards; sold at yards or in warehouses.	Most of the low-grade hay caused by late cutting and improper methods of curing.
Philadelphia, Pa.	Tim, cl-mx, some al.	Medium ⁴ (100-125).	do.	City wagon scales.	On track, private warehouses.	Cut too late; "sandwiched," as most of the product has been stacked and carelessly baled.
St. Louis, Mo.	Tim, cl-mx, al, pr, cl.	Small ² (80-100), large.	Door t.	Consignee's, shipper's.	Private warehouses.	Late cutting and improper curing.
Toledo, Ohio.	Tim.	Large ² (150), box pressed, medium, large.	None.		do.	Cut too late; reddish color; presence of fine grasses.
Washington, D. C.	Tim, cl-mx, cl.		do.			

¹ The several kinds of hay are shown in the order of importance of demand. The meanings of the symbols are as follows: al=alfalfa, bar=barley, Ber=Bermuda grass, C="coast" hay, cl=clover, corn=baled corn shucks, cr=crab-grass, gr=grass, Jn=Johnson grass, lt=light, mil=millet, mx=mixed hay, N=north, nat= native, pr=prairie hay, S=south, Tex=Texas, tim=timothy, vet=vetch, w=wild, wh=wheat.

² Kind preferred.

³ The official market weights referred to are those certified by inspectors officially appointed by the various hay markets.

⁴ Medium or three-quarter bales, 17 by 22 inches, preferred.

⁵ Required by State law.

TABLE I.—*The requirements of the various eastern, western, and southern hay markets—Continued.*

WESTERN MARKETS.

Markets.	Kinds of hay received.	Types of bales in demand (weights in pounds).	Inspection.	Kinds of market weights used.	Methods of receiving and selling.	Common faults that affect the selling price of market hay.
Boise, Idaho.	Tim, al, tim-nx.	Small.	None.	City wagon scale, shipper's, consignee's.	Private warehouses.	Timothy and mixed hay often cut too late.
Butte, Mont.	Tim, al, bluejoint.	do.	do.	do.	do.	Meadows are allowed to become too old, resulting in a mixed hay not in demand.
Denver, Colo.	S. Park wire-gr, al, Colo. bluejoint.	Small ¹ (80), 16 by 18 inches.	do.	Railroad, shipper's, consignee's.	do.	Strawed bales caused by improper curing; prairie hay not uniform in quality.
Los Angeles, Cal.	Bar, wh, oat, al, tim.	Medium (150).	do.	Railroad, city.	do.	Grain hay often cut too late; presence of dirt and weeds; hay sometimes contains too much moisture.
Ogden, Utah.	Al, tim.	Small.	do.	City wagon scale, shipper's, consignee's.	do.	Low-grade timothy caused by other grasses in meadows used too long for hay.
Phoenix, Ariz.	Al, wh, oat, bar.	Small (70-80).	do.	Railroad, city.	do.	Irrigated hay too coarse; first crop of alfalfa often badly infested with fox-tail and other grasses.
Pocatello, Idaho.	Al, tim.	Small.	do.	City wagon scale, shipper's, consignee's.	do.	Alfalfa often baled before being thoroughly cured, causing it to heat and spoil.
Portland, Oreg.	Tim, cl, wh, al, nat, vet-nx.	Medium 1 (100-150), large (200).	do.	Railroad, city.	do.	Clover hay often moldy or dusty; meadows used for hay too long.
Pueblo, Colo.	Pr, nat, al.	Small ¹ (80).	do.	City wagon scale, shipper's, consignee's.	do.	Timothy often contains foxtail; prairie hay of poor quality, due to cutting too late.
Salt Lake City, Utah.	Tim, al.	Small ¹ (80-100).	do.	do.	do.	Timothy often improperly cured in wet weather; timothy from old meadows contains too much redtop and wild grasses; rain spoils hay in partly baled stacks.
San Antonio, Tex.	Jn, N. Tex pr, al, cane, C.	Small (70-80).	do.	City.	do.	Cane hay cut too late, too coarse; prairie hay has too much "red" late-cut grass; Johnson grass often too coarse.
San Francisco, Cal.	Wh, oat, w-oat, bar, rye, grain-nx.	Large (200-220).	do.	Railroad, city.	Holding yards, sold by auction system. ²	Grain hay often cut too late; presence of dirt and weeds; hay sometimes contains too much moisture.
Seattle, Wash.	Tim, al, wh, redtop-nx, Sound hay.	Medium 2 (100-150), large (200).	do.	City wagon scale, shipper's, consignee's.	Private warehouses.	Hay often heats on account of improper curing or storing.
Spokane, Wash.	Tim, al, wh, bluejoint.	Small (100-120).	(¹)	do.	do.	Timothy meadows used too long; grain hay cut too late; considerable hay heats after being baled.

SOUTHERN MARKETS.

Atlanta, Ga.....	Tim, al, Ber, Jn, mil, corn.	Small 1 (70-100), medium 3-wire (150).	Door, bale.....	Official, shipper's, consignee's.	Private warehouses.....	Johnson grass very often cut too late.
Augusta, Ga.....	Tim, Jn, Ber, nat-mx.	Small 1 (80-100), large 5-wire (200).	None.....	Shipper's, consignee's.....	do.....	Local-grown alfalfa often improperly cured.
Birmingham, Ala.....	Tim, al, Jn, lt-mx-tim.	Small 1 (80).....	(^e).....	Railroad, shipper's.....	do.....	Timothy often cut too late, has reddish color, and is mixed with briars and grasses.
Charleston, S. C.....	Tim, tim and gr-mx.....	Small.....	None.....	Railroad, city.....	do.....	Timothy often cut too late, has red color, and contains trash and weeds.
Columbia, S. C.....	Tim, Ber, Jn.....	Small 1 (16 by 18 inches), large (18 by 22 inches).	do.....	do.....	do.....	First crop of Johnson grass often cut too late and improperly cured.
Fort Worth, Tex.....	Jn, pr, al, C.....	Small 1 (80-90).....	do.....	City.....	do.....	Cane and Johnson grass cut too late; prairie has reddish color caused by being cut too late.
Galveston, Tex.....	Tex pr, Jn, al, C, tim.....	do.....	do.....	do.....	do.....	Do.
Houston, Tex.....	Jn, pr, al, C.....	do.....	do.....	Shipper's.....	do.....	Local-grown alfalfa off color and improperly cured.
Jackson, Miss.....	Tim, Jn, al, lt-cl-mx.....	Small.....	do.....	Consignee's, shipper's.....	do.....	Medium bales should have three wires; little demand for the lower grades of hay.
Jacksonville, Fla.....	Tim, lt-cl-mx, some cl.	Medium 1 (100-125), small (70-90).	Door, warehouse.....	City.....	do.....	Red color in prairie hay is most common fault found with hay in this market.
Little Rock, Ark.....	Pr, al.....	Small 1 (80-90).....	Door, ^e plug.....	City.....	do.....	Local-grown hay often of poor color.
Macon, Ga.....	Tim, cr.....	Small 1 (80-100), large 5-wire.	None.....	Shipper's, consignee's.....	do.....	Sandwiched cars and bales often received; considerable hay off color; demand for timothy of better grades only.
Memphis, Tenn.....	Tim, cl-mx, pr, al.....	Small 1 (80-100).....	Door, bale.....	Official.....	do.....	Large amount of lower grades of timothy received in the past has caused this kind of hay to cease to be in very great demand.
Mobile, Ala.....	Tim, al.....	Small (80-100).....	(^e).....	Shipper's, city.....	do.....	A large percentage of hay grades low on account of being too mature and improperly cured.
Montgomery, Ala.....	Jn, tim, al, Ber.....	Small 1 (80-100), 14 by 18 inches.	None.....	do.....	do.....	Timothy often cut too late, has reddish color, and is mixed with briars and grasses.
New Orleans, La.....	Tim, pr, al, cl-mx, cl.....	Small, large.....	Bale.....	Platform scale at warehouse.....	Terminal warehouse.....	More low-grade hay received than in demand.
Norfolk, Va.....	Tim, lt-cl-mx, cl.....	Small, medium 1 (100-125).....	Door.....	City.....	Private warehouses.....	
Pensacola, Fla.....	Tim, al.....	Small (80).....	(^e).....	Shipper's, city.....	do.....	

- 1 Kind preferred.
2 Private warehouses used for storing hay for city trade and export.
3 Medium preferred, compressed for export.
4 Consignee has privilege of inspection.
5 Hay often inspected en route.
6 Inspection under Little Rock Exchange rules.
7 The official market weights referred to are those certified by inspectors officially appointed by the various hay markets.
8 Chamber of commerce sometimes inspects hay.
9 Buyer has privilege of door inspection.

TABLE I.—*The requirements of the various eastern, western, and southern hay markets—Continued.*

SOUTHERN MARKETS—continued.

Markets.	Kinds of hay received.	Types of bales in demand (weights in pounds).	Inspection.	Kinds of market weights used.	Methods of receiving and selling.	Common faults that affect the selling price of market hay.
Raleigh, N. C.	Tim, nat.	Small 1 (125), large.	None.	City.	Private warehouses.	Timothy often cut too late, has reddish color, and is mixed with briars and grasses.
Savannah, Ga.	Tim, pr, al.	Small (90), large.	Warehouse, bale.	Platform scale at warehouse.	Terminal warehouse.	Timothy often mixed with redtop, other grasses, and weeds.
Shreveport, La.	Tim, al, pr, Ber.	Small 1 (60-70) 14 by 18 inches.	None.	Shipper's.	Private warehouses.	Local-grown alfalfa off color and improperly cured.
Tampa, Fla.	Tim, pr, cl.	Small 1 (90-100), medium (120-150).	do.	Consignee's, shipper's.	do.	Medium bales should have three wires.
Wilmington, N. C.	Tim, some cl.	Small 1 (125), large.	(²)	Tag.	do.	Timothy often cut too late, has reddish color, and is mixed with briars and grasses.

¹ Kind preferred.² Buyer has privilege of door inspection.

SUMMARY.

(1) The demand for market hay is for better grades than those with which the market is now supplied, and the remedy for these conditions lies largely in improved meadow management, curing methods, and baling processes. Properly cured hay, if well baled and free from weeds, brings a good price in every market, but a knowledge of the conditions existing at the particular market in which his product will be sold is essential to the successful hay farmer.

(2) Many farmers produce hay merely as an incidental part of the output of their farms. These farmers pay little attention to market demands, and in consequence they receive much less for their crop than they would if these demands were met. "Choice" hay sells well in any market, and the supply of this grade in all kinds of hay is much smaller than the demand.

(3) The meadows on many farms are kept in hay long after the yield has fallen below the average. The practice permits the entrance of foreign grasses and weeds and tends to lower the grade of the whole product. The prevailing practice in many sections of delaying the harvest until the plant has reached the "second bloom," instead of cutting at the "first bloom," as required by the city consumer, also tends to put the hay in a lower grade. Improper curing and exposure to the weather before baling cause part of the hay to be damaged, and the baling of this hay with that in good condition causes the city buyers to regard with suspicion all bales having even a slight appearance of being spoiled.

(4) The methods of baling used depend on both local weather conditions and conditions at the market. In general, however, the bales which meet with most favor are those composed of many "charges" of clean hay tightly pressed and well wired. Loose bales with ragged edges break open, and inspectors are frequently obliged to class such bales as "loose hay."

(5) The type of baling press selected depends largely on the amount of baling which is anticipated. The 2-horse continuous-travel type finds a wider use than any of the others, owing both to economy in operation and to neatness of the bales pressed.

(6) The size of the baling press depends, of course, on the size of the bales demanded in the markets to which the farmer expects to send his hay. These sizes are given in detail on pages 21 and 22 of this bulletin.

(7) "Tag weight" because of its uncertainty has come to be regarded with little favor in the markets. The weight usually accepted is that taken officially at the time of delivery.

(8) The loading of cars should be carefully done under the supervision of competent inspectors, as the hay is graded by cars in most markets and "sandwiched" or mixed cars frequently cause misunderstandings between shipper and receiver.

(9) In order to make the inspection of hay as uniform as possible various markets have adopted standard grades, and this system is used to-day in 24 of the leading hay markets of the country. At the markets terminal warehouses, private warehouses, or holding yards are used for storing the hay until it is sold, and in each market the methods of weighing are standardized so that one system of inspection can be used. The organizations of men interested in the hay business have brought about the present methods, and by a clear understanding of the standard requirements of the markets to which his hay will be shipped the farmer will receive a much more satisfactory return than by shipping hay baled in a slipshod fashion or in any manner not desired by the buyers in the various markets.